FACTORS ASSOCIATED WITH UNMET HEALTH CARE NEEDS
IN HOME CARE WORKERS

Presented by Emily Gao

in partial fulfillment of the requirements for completion of the
Health Science Scholars honors program in the College of Natural Sciences at
The University of Texas at Austin

Spring 2016

_____ _____

Yuri Jang, Ph.D. Date
Supervising Professor
School of Social Work

_____ _____

Rebecca A. Wilcox, Ph.D. Date
Second Reader
Honors Center, College of Natural Sciences

Factors Associated with Unmet Health Care Needs in Home Care Workers

_____ _____

Emily Gao Date

_____ _____

Yuri Jang, Ph.D., School of Social Work Date

TABLE OF CONTENTS

ACKNOWLEDGMENTS

The completion of my thesis would not have been possible without the support of a number of people. Firstly, Dr. Yuri Jang went above and beyond as my supervisor and mentor from the very beginning. Her guidance, wisdom, and investment in myself were instrumental in producing a thesis I could be proud of. Dr. Jang also connected me with H.A.N.D., the home care agency that served as the source of my data. With that said, I want to extend a thank you to everyone who worked at H.A.N.D., especially volunteer coordinator Claire Fallat. Claire provided me with opportunities to get involved with projects at the agency and inspired me to learn more about the home care industry.

I am also thankful for Dr. Rebecca Wilcox and my peers in our thesis writing seminar. We have watched each other's projects grow, and they have never failed to give me helpful advice and encouragement.

Lastly, I am forever grateful for my friends and family. Thank you for showing interest in my thesis and for checking on how my writing was going time and time again. Your support in all of my academic endeavors means the world to me.

ABSTRACT

Though the demand for home care workers in the U.S. is growing, the workforce is characterized by high vacancy and turnover, which negatively affects the quality of care provided. Unmet health care needs may be a contributing factor, but there is a lack of research on the issue in this often ignored population. The unmet health care needs of home care workers should be better understood and addressed in order to promote the well-being of these individuals and to ensure that they can perform work tasks. The purpose of this thesis is to explore the factors associated with these unmet needs. Following Andersen's Behavioral Model of Health Services Use, predisposing characteristics (age, gender, marital status, education, race, and financial status), enabling resources (health insurance coverage), and need (self-rated health status) were considered as potential predictors. Survey data were collected from a sample of home care workers in Central Texas (n = 149). About 33% of the sample population reported not being able to receive services when needed in the past year. Logistic regression model of unmet needs identified unmarried status, being White, having financial difficulty, and lack of health insurance as significant risk factors. For instance, those who had no health insurance were 2.66 times more likely to have unmet needs than those who were insured. These findings call for home care agencies to improve health insurance benefits, wages, and social support. Such changes may strengthen the well-being and job satisfaction of home care workers, as well as reduce turnover in the workforce.

INTRODUCTION

OVERVIEW OF THE HOME CARE INDUSTRY

As the baby boomer generation ages and longevity increases in the U.S. population, so does the demand for home care services. Home care is generally described as non-medical and paramedical services that are provided in people's homes. It encompasses home health aide services, personal care, homemaker services, and companionship services. (Seavey & Marquand, 2011). For older adults and persons with disabilities, these long-term care services are often a preferred alternative to nursing homes. They allow such individuals to live in the comfort of their own homes and communities and to enjoy their autonomy and independence. Home care is also conducive to adults' engagement in their communities and better overall quality of life (Lee & Jang, 2016; Seavey & Marquand, 2011; Stone 2004).

Indeed, the home care industry has grown tremendously in the past several decades. As an alternative to inpatient care following hospitalization, home health care was originally intended to reduce hospital stay length and expenditures (Welch, Wennberg, & Welch, 1996). With the enactment of the Social Security Amendments of 1965, home health care was established as a Medicare benefit only for those who had recently been hospitalized. In the 1980's, however, changes in Medicare regulations opened home health care to a broader patient population with the purpose of maintaining health and preventing the need for institutional care (Helbing, Sangl, & Silverman, 1992). As of 2012, there were about 12,200 home health agencies in the U.S. serving more than 4.7 million clients (Harris-Kojetin, Sengupta, Park-Lee, & Valverde, 2013). These include both privately employed providers and providers publicly funded by Medicaid, Medicare, and state-financed medical assistance programs. The growth of the home care industry is evident in the increases in public expenditures on its services. Between 2000 and

2009, yearly Medicare expenditures on home health care more than tripled from $8.5 billion to $29.8 billion. Similarly, between 2000 and 2007, Medicaid expenditures more than doubled from $2.2 billion to $4.9 billion (Seavey & Marquand, 2011).

The expansion of the industry is accompanied by an increased demand for workers to provide these services. According to the U.S. Bureau of Labor Statistics, home health care will experience the second largest growth in employment among all industries between the years 2014 and 2024. Employment in the industry is projected to increase from about 1.3 million workers to about 2 million workers in these years (U.S. Bureau of Labor Statistics, 2015). Home care workers are identified by many different names, including home health aides, home care aides, personal care aides, personal care attendants, caregivers, and direct care workers, among others. The U.S. Bureau of Labor Statistics officially recognizes two job titles in the home care workforce: home health aides and personal care aides. While home health aides may provide routine health care such as changing bandages, reminding clients to take medications, and monitoring changes in health status, personal care aides strictly assist clients with activities of daily living and provide non-medical social support (U.S. Bureau of Labor Statistics, 2010).

ISSUES IN THE HOME CARE WORKFORCE

Contrary to the demand for home care workers, unsuccessful recruitment and low retention have been posing a serious challenge to the industry since the late 1990's. Based on a number of small-scale studies, Seavey and Marquand (2011) estimate annual turnover rates to range from 44% to 65% in home care agencies. High turnover can be costly to home care providers, when considering expenses associated with terminating an employee – for example, exit interview expenses, separation pay, and unemployment taxes – and then recruiting and

training a new employee. Although data concerning turnover costs are difficult to compile, one study found that they can range from $951 to $1242 per turnover (Straker & Atchley, 1999). The time it takes to train a new employee also results in lost productivity for the agency. Furthermore, turnover can have negative effects on clients and the quality of care. It disrupts the relationships that caregivers have developed and personalized with their clients. These ties are a critical aspect of home care services and directly affect clients' perceptions of quality of care. Qualitative studies have shown that clients' physical and mental functioning can be negatively impacted by sudden changes in their caregiver arrangements (Stone, 2004). In dealing with worker shortages, home care agencies may also have to put clients on waiting lists or overwork their remaining staff, further compromising the quality of care (Straker & Atchley, 1999).

One of the main overarching factors contributing to poor recruitment is the negative public image associated with home care occupations (Stone, 2004). The workforce is made up of an overwhelming female majority, with an average age in the mid-forties. Almost one half of aides are minorities, and more than one half have an education level of only a high school diploma or less (Seavey & Marquand, 2011). Home health aides and personal care aides are low-paying positions with on-the-job training but no formal education requirements. In 2010, the median hourly wage was $9.89 for home health aides and $9.44 for personal care aides. Both were well below the overall U.S. workforce's median wage of $16.27 (Seavey & Marquand, 2011). Employment benefits do not make up for these low earnings either. Due to the soaring cost of health insurance, many home care employers have decided to cut back on benefits or not offer them at all. When employers do sponsor health plans, workers are often disqualified by their part-time statuses or length of employment. Other times, workers do not enroll because they simply cannot afford the employee-contributed portion of the premium. As a result of these and

other barriers, an estimated 40 to 45 percent of home care workers are uninsured (Lipson & Regan, 2004). There is also notably a lack of opportunity for advancement in the home care industry.

Further, the nature of the work is both physically and emotionally taxing. Home care workers spend their work days performing tasks that can sometimes be unpleasant, for example, bathing clients. They inevitably become invested in the lives of their aging or disabled clients. For instance, one home care worker shared, "I cannot work with somebody for two, three years and not get emotionally involved with them… I have to get close to them or I am not going to be able to care for them in the way they should be cared for" (Denton, Zeytinoglu, Davies, & Lian, 2002). These demands often discourage candidates from entering this line of work. Many home care agencies also find it difficult to recruit desirable employees when unemployment rates are low in the labor market (Straker & Atchley, 1999).

Ample research has been conducted to study the factors that lead to poor retention in the home care workforce. Job dissatisfaction and lack of motivation can be partly explained by low wages and benefits, but they must also be attributed to other job qualities. Qualitative studies have found that home care workers who leave their employers often felt undervalued by supervisors. Workers want to feel a sense of responsibility for their services, receive regular feedback from their supervisors, and have an overall positive relationship with management. The ability to make their own decisions about work schedules and how care is provided also play a role in job stress and satisfaction. In addition, poor self-perceived job performance may cause home care workers to quit. One indicator of such inefficacy is the experience of physical injury on the job. Job-related injuries have been found to contribute significantly to turnover intention (Lee & Jang, 2016).

Even though home care revolves around caring for and promoting the well-being of others, it is considered one of the most hazardous jobs in the service industry (Stone, 2004). In 2010, more than 48,000 injuries and illnesses were reported by home care workers in the U.S. (Seavey & Marquand, 2011). Personal care aides must regularly perform housekeeping tasks, lift heavy objects for their clients, and even transfer their clients from one bodily position to another, increasing the potential for musculoskeletal disorders and accidents. Risk of infectious disease is higher for home health aides, who work directly with needles and other medical supplies. Other hazards that workers may encounter in home settings include extreme temperatures, unsanitary conditions, presence of weapons, and illegal drugs. Job stress and dissatisfaction are increased when workers are not able to comfortably report injuries or abuse so that these issues can be addressed (Seavey & Marquand, 2011). In the case of verbal mistreatment, racist and sexist attitudes can come from supervisors, co-workers, or clients (Denton et al., 2002). It is not uncommon for aides to report physical or emotional abuse from clients who either feel underserved or suffer from mental health disorders. This is a concern because the worker-client relationship is essential not only to the client but also to the worker's motivation to continue to serve the client (Stone, 2004).

The present study is based on the presumption that physical health is a point of concern for home care workers. This workforce is not, by any means, the healthiest group of individuals. In one study, Denton and colleagues (2002) found that managers of home care agencies were concerned when they witnessed health problems in their workers, including absent days due to illness or injury, job-related accidents, and high stress. Further, work-related stress in the industry has been causally linked to symptoms like fatigue, headaches, backaches, anxiety, blurred vision, heart disease, and diabetes. The burden of dealing with personal medical issues,

in turn, results in exacerbated levels of stress. Denton and colleagues (2002) recognize the importance of the health and well-being of home care workers, and they call for management and government policy improvements that will best consider these elements. It makes sense that having healthier workers would boost productivity. Home care tasks require workers to be fairly active, whether they are doing housekeeping or helping a client out of bed. Because older and disabled clients often depend on home care services daily, workers' sick days can put a damper on client-perceived quality of care, as well as the efficiency of their respective agencies (Lipson & Regan, 2004). Thus, investing in the health care of individual workers would be instrumental in building a stronger home care workforce.

UNMET NEED AS A CRITICAL INDICATOR OF HEALTH CARE ACCESS

In this study, we examine and seek to address unmet health care needs as a means for bettering worker health and well-being. Unmet health care needs can be defined as "the difference between health care services deemed necessary to deal with a particular health problem and the actual services received" (Sanmartin, 2002). It has been widely used as an indicator of access to health care. While other event-oriented measures, such as number of physician visits and hospitalization rates, demonstrate actual service use, they do not fully represent access issues. In the 1970's, Andersen and Aday (1978) posited that the equity of access is best judged by examining people's actual utilization relative to some measure of the illness they experience. The advantage of observing unmet need is that it is a process-oriented measure because it reflects individual accessibility problems and experiences with the health care system (Hou & Chen, 2002; Sanmartin, 2002). Unmet need is commonly attributed to shortcomings of the health care system such as long wait times and services being unavailable

when and where they are needed. Other times, however, personal circumstances prevent people from receiving care. These barriers include lack of insurance, high cost, transportation problems, language problems, lack of personal time, insufficient knowledge of availability of services, and negative personal views on the health care system (Sanmartin, 2002; Wu, Penning, & Schimmele, 2005).

When considering the broader scope of the issue, we find that unmet health care needs are substantial and widespread in the general U.S. population. Findings from the Medical Expenditure Panel Survey - Household Component (MEPS-HC) show that 4.7% of civilian noninstitutionalized Americans were unable to get or delayed in getting needed medical care in 2007 (Chevarley, 2010). Results also show that certain social, demographic, and economic groups are more inclined to experience unmet need. For example, 6.1% of persons ages 25-64, more than any other age group, were not able to get medical care when needed. Non-Hispanic Whites and adults with less than a high school degree were also more likely than their counterparts to have unmet needs (Chevarley, 2010).

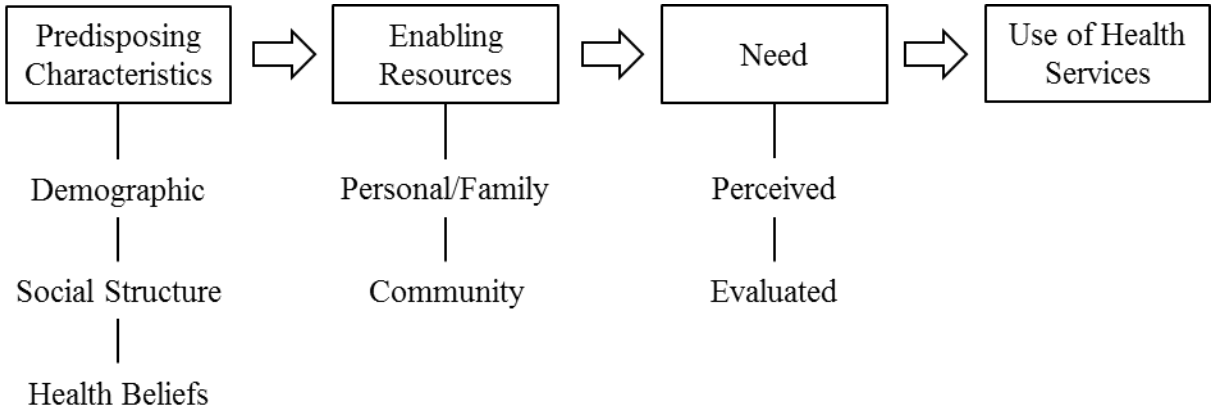
A CONCEPTUAL MODEL FOR HEALTH SERVICES USE

Much attention has been paid to the study of determinants of health service utilization because of the growing societal belief that everyone has a right to medical care, but certain population groups are not adequately receiving it (Andersen & Newman, 2005). Perhaps one of the most well-known conceptual frameworks used for understanding health care utilization is the Behavioral Model of Health Services Use, depicted in Figure 1. Originally developed in 1968 by Ronald M. Andersen, the model helps explain why families as a unit use health services, serves as a way to quantify equitable access to care, and guides policymakers towards achieving

equitable access (Andersen, 1995). Since then, the model has been both revised by Andersen himself and adapted by other scholars numerous times. It has been applied in several different areas of the health care system and in relation to a wide array of diseases. Often times, researchers use the model to study very specific populations, for example, homeless people or veterans. Though many versions of Andersen's Behavioral Model exist today, the theoretical basis remains the same for all (Babitsch, Gohl, & von Lengerke, 2012).

The essence of the Behavioral Model of Health Services Use is that an individual's characteristics and conditions contribute to health care utilization in a certain logical fashion. According to Andersen (1995), "it suggests that people's use of health services is a function of their predisposition to use services, factors which enable or impede use, and their need for care." Each of these three components – predisposing characteristics, enabling resources, and need – may be studied in terms of their individual contributions or within a sequential process that leads to service use. The Behavioral Model may also serve as a practical tool when designing experiments. It can assist in the selection and organization of relevant variables to be included in data analysis (Andersen & Newman, 2005).

Figure 1. Andersen's Behavioral Model of Health Services Use (initial version from the 1960's)



Predisposing variables. The predisposing component of Andersen's model consists of individual and contextual characteristics that exist before the onset of illness. These are not the primary cause for health service use or disuse, but people with certain predisposing characteristics may be more or less likely than others to utilize health care resources (Andersen & Newman, 2005). Variables in this category can be further classified as demographic, social structural, or health belief variables. Demographic factors like age and sex are biological imperatives that predict the likelihood that a person will have a certain illness or require a specific service. However, age itself, for example, is not a reason for someone to seek health care, so it is not considered a need variable. Other demographic factors include marital status and past illness. Social structure represents an individual's status in the community and is typically measured by variables such as by education, ethnicity, occupation, financial status, family size, and religion. These characteristics may determine the type of lifestyle an individual has, as well as their ability to deal with health problems. Assessing social structure might also create insight on the physical and social environments of the individual and their related health behavior patterns. Social network, social interaction, and culture variables could also be considered parts of the social structure. Both demographic and social structural characteristics help shape health beliefs, attitudes, and knowledge. How an individual views the health care system, physicians, and disease affects their perceived need for and subsequent use of medical services. For example, an individual who does not believe that doctors are effective is less likely to make an appointment to see one (Andersen, 1995; Andersen & Newman, 2005; Andersen & Davidson, 2007; Babitsch, Gohl, & von Lengerke, 2012).

Enabling variables. Assuming an individual is predisposed to utilize health services, they must have the financial and organizational means to get there. The enabling component of

Andersen's Behavioral Model represents the community and personal resources that permit an individual to act on a health need or value. Availability of community resources can be measured by the ratio of health personnel to population, price of health services, and geographic distribution of health facilities. If resources are affordable and physically accessible, an individual will be more inclined to use them. Provider mix, office hours, waiting times, variety of specialty services, health policies, and health education and outreach programs are also enabling factors at the community level. For example, when facilities have more non-physician clinicians providing care, they tend to have lower prices and are better able to serve Medicaid and Medicare patients. Enabling personal or family resources include income, health insurance, and access to a regular source of care. Since treatment and services run at high prices and the U.S. does not follow a universal health care system model, an individual's ability to pay for services largely decides whether or not they will receive it. In particular, health insurance coverage is a critical factor because it usually protects patients from high medical costs, allows patients to pay less for in-network provider care, and makes preventive services available for free. For those individuals with health insurance, specific coverage and co-pay requirements will determine the effective price of services, which may be a better indicator of accessibility and affordability. Means of transportation and travel time to health facilities are also considered enabling factors at the personal level (Andersen, 1995; Andersen & Newman, 2005; Andersen & Davidson, 2007; Babitsch, Gohl, & von Lengerke, 2012).

Need variables. Finally, assuming the appropriate predisposing and enabling variables are present, there must be a perceived or evaluated need for health services before it can take place. The need component is the last "step" in Andersen's Behavioral Model because it is the most direct cause of health care utilization. Perceived need is typically measured by number of

sick days, disability status, symptoms experienced by the individual, and self-rated general health. The latter variable has been widely used in research because of its simplicity and relative reliability. Note also that how an individual views their own health needs is very much a function of their social structure and health beliefs, both predisposing factors. For example, people who believe that any symptom means something is wrong with the body are more likely to seek a doctor when they experience the slightest pain. The evaluated subcomponent of need is an attempt at making an objective assessment of an individual's illness, including its severity, and need for care. A physical exam administered by a clinician would best provide this information. Alternatively, self-reported symptoms can allow a professional to make a diagnosis and judgment about the need for treatment. Evaluated need represents the biological reasons for seeking care, but it is also constructed within a social context. Disorders that are diagnosed today may not have been detected a couple decades ago, for the field of medicine is constantly changing and advancing. Both perceived and evaluated needs are included in the Behavioral Model because they are each expected to offer unique insight on health service use. Perceived need primarily aids in understanding individual health behaviors and why people seek care. On the other hand, evaluated need provides more detailed information about the type and extent of treatment given to someone seeking care (Andersen, 1995; Andersen & Newman, 2005; Andersen & Davidson, 2007; Babitsch, Gohl, & von Lengerke, 2012).

STUDY MODEL, RESEARCH QUESTIONS, AND HYPOTHESES

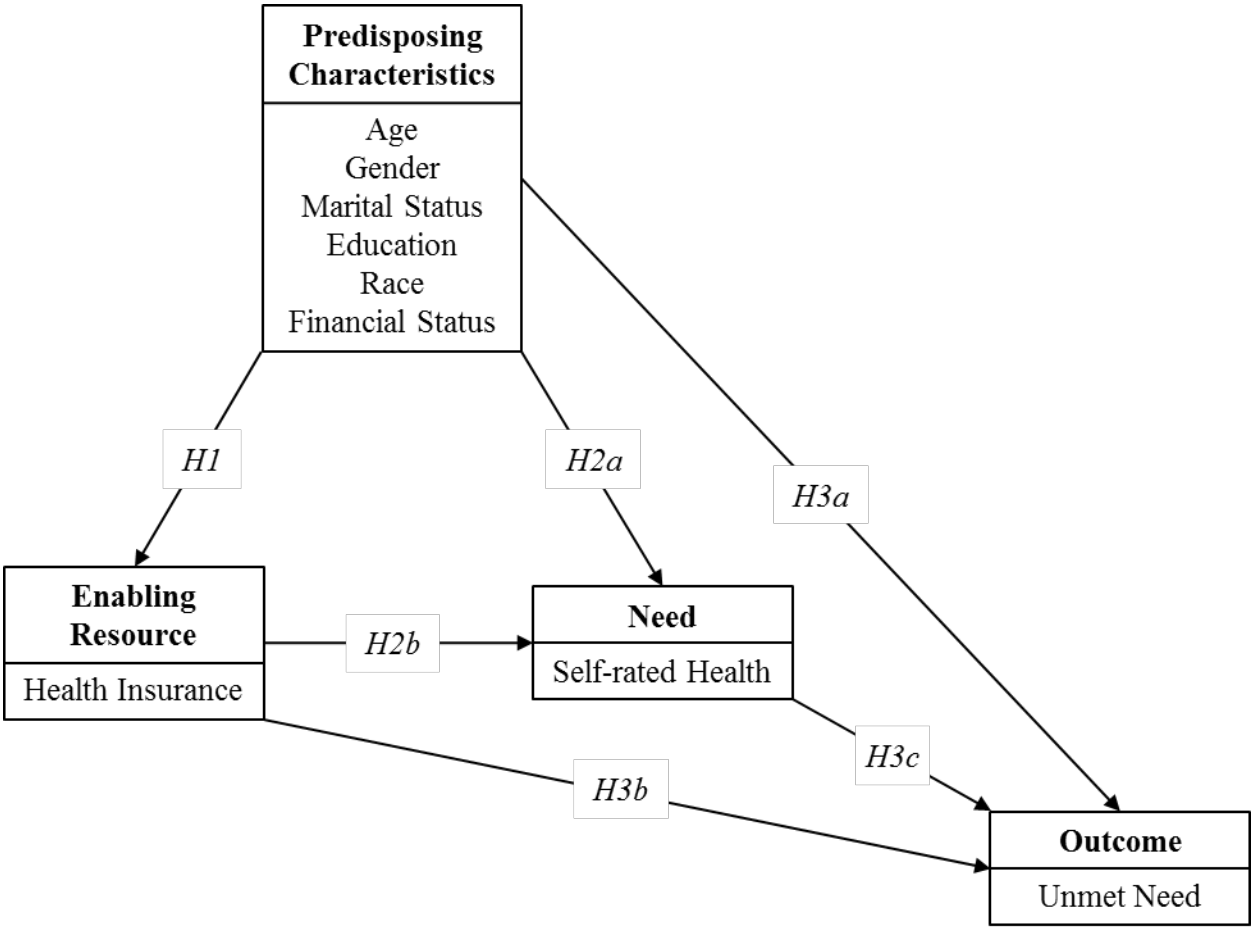
The purpose of the present study is to explore the factors associated with unmet health care needs in home care workers. We will be examining the individual contributions of predisposing characteristics, enabling resources, and need factors to having unmet needs, as well

as associations between the explanatory variables. The research questions follow a conceptual model based on the theoretical structure of Andersen's Behavioral Model of Health Services Use. This model, illustrated in Figure 2, designates unmet need as the outcome and classifies predictor variables for which data is available as predisposing, enabling, or need. Note that we focus on health insurance coverage as the sole enabling variable and self-rated health status as the need variable. The model recognizes that unmet need is influenced by all three categories of determinants and that the determinants themselves are interrelated, as well. This complex set of relationships is reflected in the research questions and hypotheses. Each hypothesis is labeled in Figure 2 on the relationship arrow it corresponds with. Specifically, we aim to answer the following three questions within the context of the home care worker population:

1. Research Question 1: What are the characteristics of home care workers who lack health insurance?
    a. Hypothesis 1: Home care workers who lack health insurance are older, female, unmarried, less educated, minorities, and financially disadvantaged.
2. Research Question 2: What are the characteristics of home care workers who have poor or fair self-ratings of health status?
    a. Hypothesis 2a: Home care workers who have poor or fair self-rated health are older, female, unmarried, less educated, minorities, and financially disadvantaged.
    b. Hypothesis 2b: Home care workers who have poor or fair self-rated health are not covered by health insurance.
3. Research Question 3: What are the characteristics of home care workers who have unmet health care needs?

a. Hypothesis 3a: Home care workers who have unmet health care needs are older, female, unmarried, less educated, minorities, and financially disadvantaged.
b. Hypothesis 3b: Home care workers who have unmet health care needs are not covered by health insurance.
c. Hypothesis 3c: Home care workers who have unmet health care needs have poor or fair self-ratings of health.

Figure 2. Study's conceptual model adapted from Andersen's Behavioral Model



Note. Hypothesis 1 (H1) concerns the predictive value of predisposing characteristics on enabling resources. Hypotheses 2a and 2b (H2a and H2b) pertain to the predictive value of predisposing and enabling variables on need, respectively. Hypotheses 3a, 3b, and 3c (H3a, H3b, and H3c) describe the predictive value of predisposing, enabling, and need variables on unmet health care needs, respectively.

This investigation will hopefully fill a gap in our understanding of the needs of home care workers. Current research on the home care sector emphasizes the needs of the clients, and studies that do focus on the workers are usually about their job characteristics. However, the workers' unmet health care needs may be a contributing factor to both turnover and the quality of home care services they provide. Studying the determinants of these unmet needs may point to targeted solutions that will improve the workers' well-being and, ultimately, the status of the home care industry. With this new knowledge and subsequent action, we can build a better workforce with more competent and satisfied home care employees.

METHODS AND MEASURES

SAMPLE

The study's sample of home care workers was collected at Helping the Aging, Needy and Disabled (H.A.N.D.), a non-profit home care agency located in Central Texas. H.A.N.D. is dedicated to helping older adults (i.e. age 55 and up) and adults with disabilities live independently and comfortably in their own homes. The two main services that H.A.N.D. provides are personal care attendant services and transportation to doctor's appointments, work, and social activities. H.A.N.D. was first established in 1972 and now serves approximately 600 clients in the surrounding area. It currently employs about 250 personal care attendants who assist clients with non-medical activities of daily living, including bathing, grooming, toileting, cleaning, cooking, feeding, grocery shopping, and transfer from one position to another. In order to qualify for employment, individuals must be capable of performing at least some of these personal care tasks, though on-the-job training is provided. Candidates must also pass criminal

history and other registry checks. Moreover, H.A.N.D. looks for emotionally mature and compassionate individuals whom clients can depend on (H.A.N.D., n.d.).

Study participants completed a survey questionnaire approved by the University of Texas at Austin's Institutional Review Board (IRB). The survey was distributed to potential participants in the fall of 2014. It was 11 pages long and consisted of demographic, personal, and job-related questions. Additionally, it was available in both English and Spanish. The paper surveys were mailed to all 250 personal care attendants listed in H.A.N.D.'s employee directory. Recipients completed the survey questionnaire themselves if they were interested in participating. Upon delivering the completed questionnaires to the H.A.N.D. reception desk, participants collected their $10 cash incentive. Out of the 250 surveys mailed out, 151 were completed and returned, equivalent to a 60.4% response rate. Two cases were excluded from the final sample due to more than 20% of the questionnaire being unanswered. The final sample size used in the study was 149.

MEASURES

Outcome variable. Unmet need for health care was measured using a single survey item asking whether there was a time in the past year when the respondent needed medical care but could not receive services (0 = *no*, 1 = *yes*).

Predisposing variables. Basic demographic information was collected for each participant and recoded if necessary. These predisposing variables include age (0 = *40 years and younger*, 1 = *older than 40 years*), gender (0 = *male*, 1 = *female*), marital status (0 = *married or living with partner*, 1 = *not married nor living with partner*), education level (0 = *high school diploma or higher*, 1 = *less than high school diploma*), and race (0 = *White*, 1 = *non-White*).

Perceived financial status was measured with a survey question asking if the respondent usually had money left over at the end of the month, just enough to make ends meet, or not enough money to make ends meet. The former two answer options were combined to create a binary variable (0 = *enough or more than enough money to make ends meet*, 1 = *not enough money to make ends meet*).

Enabling variable. In this study, enabling resources were represented by health insurance coverage. Participants were asked if they had health insurance at the time and were given the choices 'no,' 'yes, through H.A.N.D.,' 'yes, through my spouse/partner,' 'yes, through Medicaid,' 'yes, through Medicare,' or 'yes, through other source.' The last five options were grouped to construct a binary variable (0 = *has health insurance*, 1 = *does not have health insurance*).

Need variable. Overall need for health care was assessed using a single item asking respondents how they would rate their overall health at the present time. Answers were on a 5-point scale ranging from 'excellent' to 'poor.' They were then recoded into a binary variable (0 = *excellent, very good, or good*, 1 = *fair or poor*). Though it is a subjective measure, self-rated health has been shown to be a reliable indicator of overall health status (Jylhä, 2009). Specifically, studies have demonstrated that it is a consistent predictor of physician service use, occurrence of chronic illnesses, physician-rated health status, functional decline, and even mortality (Lee, 2000; Miilunpalo, Vuori, Oja, Pasanen, & Urponen, 1997). Furthermore, self-rated health is a comprehensive and integrative measure, as the respondent will usually take into consideration medical diagnoses, experienced symptoms, functional status, health behaviors, reference groups, and earlier health experiences, among other factors (Jylhä, 2009).

ANALYTIC STRATEGY

The survey data were coded and analyzed in IBM SPSS Statistics Version 23. In order to get an overview of the characteristics of the sample, descriptive information, including frequencies and means, were collected for variables of interest. All study variables were recoded into binary variables as defined previously. Because several of the variables were categorical with no logical order of levels, this strategy helped us avoid making meaningless interpretations from statistical methods designed for numerical data. The use of binary variables made it possible to generate direct comparisons between experimental categories (coded as 1) and reference categories (coded as 0). Bivariate analysis was then conducted to evaluate associations among the study variables, and statistically significant Spearman's rank-order correlations were noted. Spearman's correlation coefficient (r_s) is a measure of the strength of association between two ranked variables. It was computed for every combination of two variables in the study. Next, logistic regression analysis was used to assess the predictive value each explanatory variable individually had on unmet need, given that every other variable in the predictive model was controlled for. Logistic regression offers a way to model the probability or odds of an outcome variable taking a certain value as a function of a set of explanatory variables.

RESULTS

DESCRIPTIVE CHARACTERISTICS

Table 1 summarizes descriptive information about the sample and study variables. The sample was composed of 149 participants, all of who were personal care attendants employed by H.A.N.D. The ages of the participants ranged from 18 to 82, with an average age of 47.6 (*SD* = 14.6). Most of the participants were female (85.9%), and a large majority were non-White

(87.2%). The education level for approximately 64% of the participants was less than a high school diploma. Additionally, almost three quarters were neither married nor living with their partners (72.6%). The average household size was 3.02 (*SD* = 1.63), and more than half of the participants reported a household income of less than $10,000 per year (53.1%).

The participants served an average of 2.04 clients (*SD* = 3.90) at H.A.N.D., and approximately 13% lived with their clients. Most of the personal care attendants had been in their line of work for two years or more (68.9%). The participants worked an average of 21.9 hours per week (*SD* = 11.5) with an average hourly wage of $8.08 (*SD* = .84). Almost 30% worked another job outside of H.A.N.D.

More than 40% of the participants had no form of health insurance. Those who selected 'other' types of health insurance further specified The Medical Access Program, Blue Cross and Blue Shield of Texas, ClinCard, Lone Star Circle of Care, Humana, ActivHealthCare, the Health Insurance Marketplace, retirement plans, and other employers as their source of insurance. Approximately 17% of the participants rated their overall health status as 'fair' or 'poor.' According to a shortened version of the Center for Epidemiologic Studies Depression Scale, 17.8% were classified with probable depression (Zhang et al., 2012). Finally, 32.7% reported an unmet need for health care, defined as one or more instances of needing medical care but not being able to receive services in the past year.

Table 1. Descriptive Characteristics of Home Care Worker Sample (n = 149)

Original Variables	**M ± SD (range) or %**	**Recoded Binary Variables**	**Recoded Variable %**
Predisposing Characteristics		**Predisposing Characteristics**	
Age		*Age*	
Years	47.6 ± 14.6 (18-82)	≤ 40 years	31.1
		> 40 years	68.9
Gender		*Gender*	
Male	14.1	Male	14.1
Female	85.9	Female	85.9
Marital status		*Marital status*	
Married	20.5	Married or living with partner	27.4
Living with partner	6.8	Not married nor living with partner	72.6
Widowed	10.3		
Divorced	19.2		
Separated	7.5		
Never married	35.6		
Education		*Education*	
Years of school completed	11.7 ± 2.75 (0-17)	≥ High school diploma	36.2
		< High school diploma	63.8
Race		*Race*	
White	12.8	White	12.8
African-American or Black	40.9	Non-White	87.2
Hispanic	44.3		
American Indian or Alaska Native	0.0		
Native Hawaiian or Pacific Islander	0.0		
Asian	0.0		
Other	2.0		
Perceived financial status		*Perceived financial status*	
More than enough money to make ends meet	14.2	Enough or more than enough money to make ends meet	47.3
Just enough money to make ends meet	33.1	Not enough money to make ends meet	52.7
Not enough money to make ends meet	52.7		
Enabling Resource		**Enabling Resource**	
Type of health insurance		*Health insurance coverage*	
None	40.3	No	40.3
Through H.A.N.D.	3.4	Yes	59.7
Through spouse/partner	3.4		
Medicaid	8.7		
Medicare	11.4		
Other	32.9		
Perceived Need		**Perceived Need**	
Self-rated overall health		*Self-rated overall health*	
Excellent	19.5	Excellent, very good, or good	83.2
Very good	22.1	Fair or poor	16.7
Good	41.6		
Fair	15.4		
Poor	1.3		
Outcome Variable		**Outcome Variable**	
Unmet need for health care in past year		*Unmet need for health care in past year*	
Yes	32.7	Yes	32.7
No	67.3	No	67.3

CORRELATIONS AMONG STUDY VARIABLES

The bivariate correlations among study variables are shown in Table 2. Health insurance coverage, the focal enabling resource, was significantly correlated with three predisposing variables: age (r_s = -.25, p < .01), marital status (r_s = .22, p < .01), and perceived financial status (r_s = .2, p < .05). Participants in the older age group, those who were married or living with a partner, and those without financial difficulties were more likely to be covered by some form of health insurance. Self-rated health, the study's need variable, was not associated with any of the predisposing or enabling variables. Unmet need for medical care was found to be significantly correlated with health insurance (r_s = .28, p < .001) and three predisposing variables: race (r_s = -.27, p < .001), marital status (r_s = .29, p < .001), and perceived financial status (r_s = .31, p < .001). White participants, those who were not married nor living with a partner, those with financial difficulties, and those without health insurance were more likely to experience unmet health care needs. No two predictor variables had a correlation coefficient greater than 0.25, which suggests that collinearity was not an issue.

Table 2. Correlations among Study Variables

	1	2	3	4	5	6	7	8	9
1. > Age 40									
2. Female	-0.06								
3. Not married nor living with partner	0	0.05							
4. < High school diploma	-0.2 *	-0.19 *	0.12						
5. Non-White	0	0.02	-0.09	-0.12					
6. Not enough money to make ends meet	-0.09	0.12	0.08	0.04	0.04				
7. No health insurance	-0.25 **	0.1	0.22 **	0.02	-0.01	0.2 *			
8. Fair/poor self-rated health	0.06	0.13	0.1	-0.1	-0.08	0	-0.11		
9. Unmet need for health care	-0.12	0.04	0.29 ***	0.05	-0.27 ***	0.31 ***	0.28 ***	0.1	

* $p < .05$, ** $p < .01$, *** $p < .001$

PREDICTIVE MODEL OF HEALTH INSURANCE COVERAGE

A logistic regression model of health insurance coverage is shown in Table 3. Results of this regression analysis partially support Hypothesis 1. When other variables in the model were controlled for, participants who were not married nor living with a partner were 2.52 times more likely to lack health insurance (OR = 2.52, CI = 1.05-6.05, $p < .05$). Age was also a significant predictor of health insurance coverage but not in the direction that was expected. Workers who were 40 years old or younger were only 39% as likely as their older counterparts to be covered by insurance (OR = .39, CI = 0.18-0.84, $p < .05$).

Table 3. Logistic Regression Model of Lack of Health Insurance Coverage

Variable	OR	95% CI
Predisposing Characteristics		
> Age 40	.39 *	0.18 to 0.84
Female	1.52	0.51 to 4.56
Not married nor living with partner	2.52 *	1.05 to 6.05
< High school diploma	.77	0.35 to 1.67
Non-White	.87	0.29 to 2.56
Not enough money to make ends meet	1.95	0.95 to 4.00

OR = odds ratio, CI = confidence interval, * $p < .05$, ** $p < .01$, *** $p < .001$

PREDICTIVE MODEL OF SELF-RATED HEALTH

Table 4 summarizes a logistic regression model of self-rated health status. Because none of the predisposing characteristics emerged as significant predictors, these results did not support Hypothesis 2a. The study's enabling variable, health insurance coverage was a predictor of self-rated health but in the direction opposite of what was expected. Workers without health insurances were 0.46 times as likely as workers with insurance to rate their overall health as fair or poor (OR = .46, CI = 0.21-0.97, $p < .05$). Hypothesis 2b is disproved based on this finding.

Table 4. Logistic Regression Model of Fair/Poor Self-rated Health

Variable	OR	95% CI
Predisposing Characteristics		
> Age 40	1.17	0.53 to 2.59
Female	2.18	0.80 to 5.92
Not married nor living with partner	2.05	0.90 to 4.63
< High school diploma	.58	0.27 to 1.27
Non-White	.62	0.21 to 1.84
Not enough money to make ends meet	.97	0.48 to 1.97
Enabling Resource		
No health insurance	.46 *	0.21 to 0.97

OR = odds ratio, CI = confidence interval, * $p < .05$, ** $p < .01$, *** $p < .001$

PREDICTIVE MODEL OF UNMET HEALTH CARE NEEDS

Table 5 shows the result of a logistic regression model of unmet health care needs. Hypothesis 3a was partially supported by this analysis. The predisposing characteristics marital status and perceived financial status were found to be significant predictors. Study participants who were not married nor living with a partner were 5.19 times more likely to experience unmet needs, compared to those who were married or living with a partner (OR = 5.19, CI = 1.45-18.5, $p < .05$,). In addition, those who were not able to make ends meet financially were about 5 times more likely to experience unmet needs (OR = 5.03, CI = 1.98-12.8, $p < .001$). Race as a predisposing characteristic was also a significant predictor but not in the expected direction. When other variables were controlled for, non-White home care workers were only 10% as likely as White workers to have unmet health needs (OR = .10, CI = 0.03-0.40, $p < .001$).

Hypothesis 3b was supported by logistic regression analysis. Health insurance coverage as an enabling resource emerged as a significant predictor. Not having insurance increased the odds of health care needs not being met by 2.66 times (OR = 2.66, CI = 1.09-6.53, $p < .05$).

Perceived need for medical care, represented by self-rated health status, did not make a statistically significant contribution in this model, so Hypothesis 3c was not proven.

Table 5. Logistic Regression Model of Unmet Health Care Needs

Variable	OR	95% CI
Predisposing Characteristics		
> Age 40	.95	0.37 to 2.42
Female	.81	0.23 to 2.86
Not married nor living with partner	5.19 *	1.45 to 18.5
< High school diploma	.90	0.36 to 2.24
Non-White	.10 ***	0.03 to 0.40
Not enough money to make ends meet	5.03 ***	1.98 to 12.8
Enabling Resource		
No health insurance	2.66 *	1.09 to 6.53
Perceived Need		
Fair/poor self-rated health	1.71	0.70 to 4.23

OR = odds ratio; CI = confidence interval, * $p < .05$, ** $p < .01$, *** $p < .001$

DISCUSSION

DISCUSSION OF FINDINGS

Recognizing the many issues present in the home care workforce and the lack of attention being paid to the workers' well-being, the present study examined factors associated with unmet health care needs in a sample of personal care attendants. Following the conceptual framework of Andersen's Behavioral Model of Health Services Use, we studied the effects of predisposing (age, gender, marital status, education, race, and financial status), enabling (health insurance coverage), and need (self-rated health) variables on each other, as well as on having unmet health care needs.

The descriptive characteristics of the study sample suggest that it adequately represents the greater home care worker population. Consistent with the public image of a personal care

attendant, the study participants tended to be older (i.e. > age 40), female, minorities, and less educated (i.e. < high school diploma).

Our findings also suggest that unmet health care needs in home care workers are a noteworthy issue. About 33% of the sample population reported not being able to receive services when needed in the past year. This is much higher than the estimated 4.7% of the overall U.S. population who are unable to get or experience delays in getting care, according to the 2007 Medical Expenditure Panel Survey.

We began by exploring some of the explanatory variables in the study. As hypothesized, home care workers who lacked health insurance were mostly unmarried and had lower financial statuses. One possible explanation is that, in many cases, married individuals have the option to obtain insurance through their spouses' plans. In addition, having a spouse usually makes insurance more affordable because the combined family income is greater than the individual's (Bernstein, Cohen, Brett, & Bush, 2008). In the study, we found that workers without financial difficulties were more likely to be insured than those who felt they could not make ends meet. Private health insurance is expensive, and it is often considered a luxury. Thus, individuals who do not qualify for Medicaid or Medicare and have little or no disposable income will allocate money towards basic necessities before private health insurance.

In the predictive model of unmet health care needs, predisposing characteristics and enabling resources affected the experience of unmet need as hypothesized. Home care workers without any form of health insurance were more likely to have unmet needs. This underscores the well-documented concept that lack of insurance is a key barrier to access to health care (Andersen & Davidson, 2007). Participants who had unmet health care needs were also predominantly unmarried or not living with a partner and reported financial difficulties. This

could be explained through health insurance coverage as a critical resource. Even if they are not married, a person living with a partner generally benefits from greater social support. An individual's significant other is considered a member of their primary group of social ties, as defined by Thoits. These members may provide encouragement, as well as informational and instrumental assistance, when it comes to managing health problems and obtaining care (Thoits, 2011). Low financial status may contribute to unmet need through the inability to purchase health insurance, as described previously. Paying out-of-pocket for services may not be an affordable option for these persons either.

A few of the predictive relationships that emerged in the analysis were not initially expected. For instance, participants in the '> Age 40' group were more likely to be covered by some form of health insurance. One possible explanation is that older people tend to have more illnesses and use services more often, so health insurance is a higher priority for them. Further, most people will not qualify for Medicare coverage until age 65. (Centers for Medicare & Medicaid Services, n.d.)

In this particular sample, participants who were White were more likely to have unmet health care needs. This finding is inconsistent with other studies but may be due to the fact that only a small portion of the sample population was White (12.8%). It is possible that these few individuals just so happen to have greater unmet needs than the non-White subgroup overall. Moreover, White persons working in home care are probably among the poorest of their racial group, while African-American and Hispanic home care workers are not necessarily at the bottom of the socioeconomic ladder (Jaret, Reid, & Adelman, 2003).

STUDY LIMITATIONS

The present study has its shortcomings, in terms of design and execution. Firstly, the sample had a relatively small size and consisted of personal care attendants from a single home care agency, limiting the generalizability of results. Future studies should include participants from multiple agencies in different locations because organizational characteristics could have an effect on the experiences of the workers. Another weakness of the study is the narrow range of variables observed. Although predisposing, enabling, and need factors were all represented, much of the variance in unmet need is not explained by the study variables. Future efforts should broaden the set of studied factors to include participants' health beliefs, availability of community resources, and clinical assessments of need for health care. Using objective measures of need, in addition to self-ratings of health status, may be more reliable and consistent. Although self-reported data are easier to obtain, some people question the validity of these measures. In the present study, self-rated health was not correlated with any of the predisposing, enabling, or outcome variables as expected. This reflects the wide scope of social and individual determinants that affect a person's judgment of their health status. As described previously, this self-rating is partially based on sociodemographic and tangible health factors, but it is also constructed by comparing oneself to reference groups and earlier health status. With so many confounding variables, it is inherently difficult to identify a simple relationship between any one predisposing or enabling variable and self-rated health.

IMPLICATIONS OF FINDINGS

Despite the study's limitations, our findings have important implications and contribute to the collection of research on the often ignored home care workforce. The unmet health care

needs of this population have not been paid attention in the past. We show here that it is a pressing issue that needs to be better understood and addressed. Moving forward, home care agencies and policymakers should work to make changes and implement policies that will help these workers meet their health care needs.

Based on the impact of both financial status and health insurance on having unmet health care needs, we recommend increasing wages and insurance benefits for home care workers. Their wages have historically been low, and many do not receive employer-provided health insurance due to various reasons. The idea of raising wages and improving benefits for home care workers is not entirely new. Health care policymakers in the past have acknowledged that taking care of the workers themselves is essential to building a workforce that can adequately serve the Americans who require home care services. In 2010, the Affordable Care Act (ACA) authorized the establishment of the Personal Care Attendants Workforce Advisory Panel under section 8002 of the legislation. The panel was part of a larger agency created by the ACA called the Community Living Assistance Services and Supports (CLASS) Office, which aimed to help people enroll in insurance plans for long-term services such as home care. The purpose of the 15-member panel was to examine and advise Congress on issues regarding the personal care attendant workforce, which include wages, benefits, and sufficiency of number of workers available to provide services (Moulds, 2011). Though this provision was intended to readjust the infrastructure of the personal care attendant workforce, it failed to do so. The CLASS Act was repealed on January 1, 2013 due to it being financially inviable (American Taxpayer Relief Act of 2012). Clearly, making substantial improvements in wages and benefits for home care workers is not an easy feat. With this in mind, another approach to increasing health insurance coverage in this population is by expanding Medicaid and other public insurance programs.

These are important options when workers do not have access to or are ineligible for employer-sponsored health plans. Although many workers' low-income statuses already qualify them for public programs, lowering income eligibility thresholds and enrollment requirements would allow even more workers to obtain insurance, closing the coverage gap that currently exists (Lipson & Regan, 2004).

The finding that marital status affects unmet health care needs points to directions that future research endeavors could take. Marital status itself is typically not considered a mutable variable. That is, it cannot realistically be manipulated to influence health service utilization. (Andersen & Aday, 1978). Nonetheless, this connection suggests that an individual's social network and social support may play important roles in determining their propensity and ability to access health care. Future studies should not only explore this relationship but also examine the impact of organizational support on unmet health care needs. Unlike marital status, an employer's practices and policies can be altered on purpose. For example, development of health education programs for workers and increased supervisor support are two changes that could be implemented.

CONCLUSION

In addition to its current worker shortage, the home care sector is facing challenges like worker dissatisfaction and a negative public image. As a contributing factor to these issues, unmet health care needs and their potential risk factors were explored in the present study. Based on analysis of survey data from a Central Texas home care agency, employers and policymakers should work to improve wages, insurance benefits, and social support. Aimed at modifying certain predisposing and enabling variables, these interventions may help reduce the alarming

presence of unmet health care needs in home care workers. These workers are a critical component of the U.S. health care system and must be taken care of. By helping them maintain their physical health, we can ensure their ability to perform work tasks and, more importantly, their overall well-being. In the long run, addressing unmet health care needs may increase job satisfaction and decrease employee turnover. The status of the home care industry and quality of services it provides depend on how the workers are regarded and treated.

REFERENCES

American Taxpayer Relief Act of 2012, Pub. L. No. 112-240, §642, 126 Stat. 2358 (2013). Retrieved from https://www.gpo.gov/fdsys/pkg/PLAW-112publ240/pdf/PLAW-112publ240.pdf.

Andersen, R., & Aday, L. A. (1978). Access to Medical Care in the U.S.: Realized and Potential. *Medical Care, 16*(7), 533-546.

Andersen, R. M., & Davidson, P. L. (2007). Improving Access to Care in America: Individual and Contextual Indicators. In R. M. Andersen, T. H. Rice, & G. F. Kominski (Eds.), *Changing the U.S. Health Care System: Key Issues in Health Services Policy and Management* (pp. 3-31). San Francisco, CA: John Wiley & Sons.

Andersen, R., & Newman, J. F. (2005). Societal and Individual Determinants of Medical Care Utilization in the United States. *Milbank Quarterly, 83*(4), 1-28.

Andersen, R. M. (1995). Revisiting the Behavioral Model and Access to Medical Care: Does it Matter? *Journal of Health and Social Behavior, 36*(1), 1-10.

Babitsch, B., Gohl, D., & von Lengerke, T. (2012). Re-revisiting Andersen's Behavioral Model of Health Services Use: a systematic review of studies from 1998–2011. *GMS Psycho-Social-Medicine*, *9*, 1-15.

Bernstein, A. B., Cohen, R. A., Brett, K. M., & Bush, M. A. (2008). Marital status is associated with health insurance coverage for working-age women at all income levels, 2007. *NCHS Data Brief*, (11), 1-8.

Centers for Medicare & Medicaid Services. (n.d.). What's Medicare? Retrieved from: https://www.medicare.gov/sign-up-change-plans/decide-how-to-get-medicare/whats-medicare/what-is-medicare.html.

Chevarley, F. M. (2010). *Percentage of Persons Unable to Get or Delayed in Getting Needed Medical Care, Dental Care, or Prescription Medicines: United States, 2007* (Statistical brief No. 282). Rockville, MD: Agency for Healthcare Research and Quality.

Denton, M., Zeytinoglu, I. U., Davies, S., & Lian, J. (2002). Job Stress and Job Dissatisfaction of Home Care Workers in the Context of Health Care Restructuring. *International Journal of Health Services, 32*(2), 327-357.

H.A.N.D. (n.d.). Our Role & Impact. Retrieved from http://www.handcentraltx.org/.

Harris-Kojetin, L., Sengupta, M., Park-Lee, E., & Valverde, R. (2013). Long-Term Care Services in the United States: 2013 Overview. National Center for Health Statistics. *Vital and Health Statistics, 3*(37), 1-107.

Helbing, C., Sangl, J. A., & Silverman, H.A. (1992). Home health agency benefits. *Health Care Financing Review*, *Annual Supplement,* 125-148.

Hou, F., & Chen, J. (2002). Unmet needs for health care. *Health Reports*, *13*(2), 23-34.

Jaret, C., Reid, L. W., & Adelman, R. M. (2003). Black-White Income Inequality and Metropolitan Socioeconomic Structure. *Journal of Urban Affairs, 25*(3), 305-333.

Jylhä, M. (2009). What is self-rated health and why does it predict mortality? Towards a unified conceptual model. *Social Science & Medicine, 69*(3), 307-316.

Lee, A. A., & Jang, Y. (2016). What Makes Home Health Workers Think about Leaving Their Job? The Role of Physical Injury and Organizational Support. *Home Health Care Services Quarterly*. In Press.

Lee, Y. (2000). The predictive value of self assessed general, physical, and mental health on functional decline and mortality in older adults. *Journal of Epidemiology & Community Health, 54*(2), 123-129.

Lipson, D., & Regan, C. (2004). *Health Insurance Coverage for Direct Care Workers: Riding Out the Storm* (Issue brief No. 3). Washington D.C.: Institute for the Future of Aging Services. Retrieved from http://phinational.org/research-reports/health-insurance-coverage-direct-care-workers-riding-out-storm.

Miilunpalo, S., Vuori, I., Oja, P., Pasanen, M., & Urponen, H. (1997). Self-Rated Health Status as a Health Measure: The Predictive Value of Self-Reported Health Status on the Use of Physician Services and on Mortality in the Working-Age Population. *Journal of Clinical Epidemiology, 50*(5), 517-528.

Moulds, D. B. (2011). *A Report on the Actuarial, Marketing, and Legal Analyses of the CLASS Program. Appendix G: Personal Care Attendants Workforce Advisory Panel* (U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation). Retrieved from https://aspe.hhs.gov/report/report-actuarial-marketing-and-legal-analyses-class-program/appendix-g-personal-care-attendants-workforce-advisory-panel.

Sanmartin, C. (2002). Changes in unmet health care needs. *Health Reports*, *13*(3), 15-21.

Seavey, D., & Marquand, A. (2011). *Caring in America, A Comprehensive Analysis of the Nation's Fastest-Growing Jobs: Home Health and Personal Care Aides* (Rep.). Bronx, NY: Paraprofessional Healthcare Institute. Retrieved from http://www.phinational.org/sites/phinational.org/files/clearinghouse/caringinamerica-20111212.pdf.

Stone, R. I. (2004). The Direct Care Worker: The Third Rail of Home Care Policy. *Annual Review of Public Health, 25*(1), 521-537.

Straker, J. K., & Atchley, R. C. (1999). *Recruiting and retaining frontline workers in long-term care: Usual organizational practices in Ohio*. Oxford, OH: Scripps Gerontology Center,

Miami University. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.548.6716&rep=rep1&type=pdf.

Thoits, P. A. (2011). Mechanisms Linking Social Ties and Support to Physical and Mental Health. *Journal of Health and Social Behavior, 52*(2), 145-161.

U.S. Bureau of Labor Statistics. (2010). *2010 SOC Definitions*. Retrieved from http://www.bls.gov/soc/soc_2010_definitions.pdf.

U.S. Bureau of Labor Statistics. (2015). *Employment Projections – 2014-24* [Press release]. Retrieved from http://www.bls.gov/news.release/pdf/ecopro.pdf.

Welch, H. G., Wennberg, D. E., & Welch, W. P. (1996). The Use of Medicare Home Health Care Services. *The New England Journal of Medicine, 335*(5), 324-329.

Wu, Z., Penning, M. J., & Schimmele, C. M. (2005). Immigrant status and unmet health care needs. *Canadian Journal of Public Health, 96*(5), 369-373.

Zhang, W., O'Brien, N., Forrest, J. I., Salters, K. A., Patterson, T. L., Montaner, J. S. G., … Lima, V. D. (2012). Validating a Shortened Depression Scale (10 Item CES-D) among HIV-Positive People in British Columbia, Canada. *PLoS ONE 7*(7): e40793.

ABOUT THE AUTHOR

Emily Gao was born in Galveston, TX in October of 1993. She grew up with her parents Zu Cheng and Yan Li Gao, as well as her three sisters Eva, Erica, and Ellie Gao. After graduating from Ball High School, she began her studies at the University of Texas at Austin as a Health Science Scholar. During her four years at UT, Emily was involved in activities and student groups like the Freshman Research Initiative, Global Medical Training, Texas Joint Admission Medical Program, and Chinese Student Association. She plans to graduate in May of 2016 with a Bachelor of Science and Arts in Biology, along with a Business Foundations Certificate. Emily's future plans include attending UT Southwestern Medical School, in hopes of one day becoming a primary care physician.